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SHINE 2012 Abstracts

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Title of Poster/Presentation:

Inferring lower boundary driving conditions using vector magnetic field observations

Abstract:

Low-beta coronal MHD simulations of realistic CME events require the detailed specification of the magnetic fields, velocities, densities, temperatures, etc., in the low corona. Presently, the most accurate estimates of solar vector magnetic fields are made in the high-beta photosphere. Several techniques have been developed that provide accurate estimates of the associated photospheric plasma velocities such as the Differential Affine Velocity Estimator for Vector Magnetograms and the Poloidal/Toroidal Decomposition. Nominally, these velocities are consistent with the evolution of the radial magnetic field. To evolve the tangential magnetic field radial gradients must be specified. In addition to estimating the photospheric vector magnetic and velocity fields, a further challenge involves incorporating these fields into an MHD simulation. The simulation boundary must be driven, consistent with the numerical boundary equations, with the goal of accurately reproducing the observed magnetic fields and estimated velocities at some height within the simulation. Even if this goal is achieved, many unanswered questions remain. How can the photospheric magnetic fields and velocities be propagated to the low corona through the transition region? At what cadence must we observe the photosphere to realistically simulate the corona? How do we model the magnetic fields and plasma velocities in the quiet Sun? How sensitive are the solutions to other unknowns that must be specified, such as the global solar magnetic field, and the photospheric temperature and density?

Session: Data driven MHD modeling of CME events

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